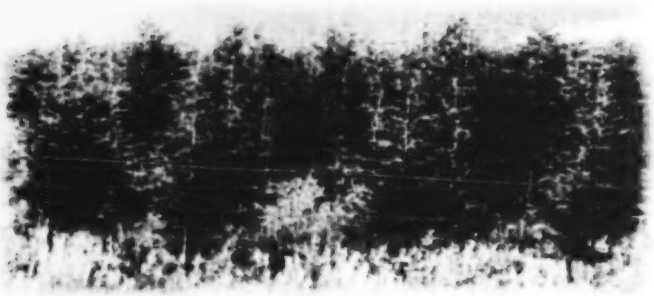
HOW TO USE A

Stand Density Management Diagram

Yield predictions for a spacing prescription



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INTRODUCTION

This guide provides a step-by-step example of how to obtain rough yield predictions at rotation for a spacing prescription through the use of a stand density management diagram (SDMD). A six-metre tall hemlock stand on site index 27 m is used in this example.

STEP ONE - *Determine whether a SDMD is the right tool for the job*

To determine whether the SDMD is the right tool for the job, answer these questions:

a. *Question: Is its low resolution, stand average output adequate for your needs?*

Answer: **Yes** - the SDMD yield predictions will be used in the forest products objectives section of the prescription. For this purpose, rough, stand average yield predictions are adequate.

b. *Question: Does your stand have the stand structure assumed by the diagram (relatively pure species, single layer, even-aged)?*

Answer: **Yes** - the stand in this example is a single layer, even-aged stand of almost pure hemlock.

c. *Question: Will your stand have a growth trajectory like the untreated stands assumed by the SDMD (no repression; no catastrophic losses to disease, insect, or damage; growth like a untreated stand with the same top height, trees/ha, and mean diameter)?*

Answer: **Yes** - there is no reason to suspect that the SDMD growth trajectories are inappropriate for the stand in this example.

STEP TWO - *Select the right SDMD*

The selection of the right SDMD to use is based on region, leading species, and tree spatial distribution.

a. **Region:** Because stand growth patterns differ between the coast and the interior, there is one set of SDMDs for coastal sites and another set for interior sites. The stand in this example is located on the coast, so use a coastal SDMD.

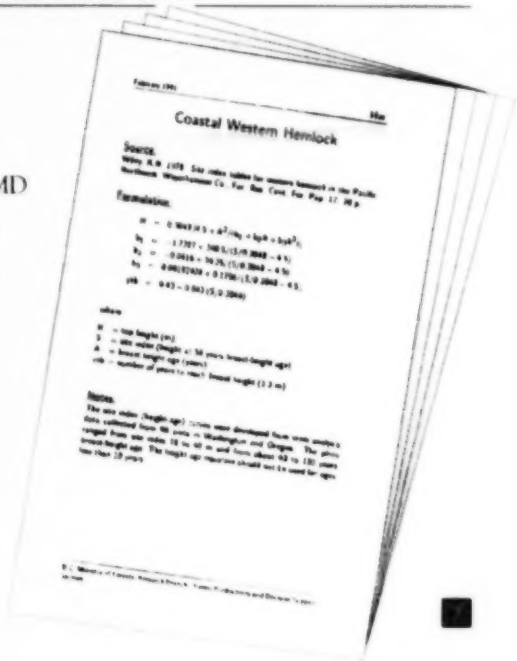
b. **Species:** SDMDs are built for pure species stands. Yield predictions from SDMDs become less reliable as species composition deviates from pure. Since the stand in this example is almost pure hemlock, use the Hw SDMD.

c. **Spatial:** Because stand growth patterns differ with the degree of clumping of trees, separate SDMDs are available for stands that are clumped and stands that have uniform spacing between trees. Once the stand is spaced, there will be relatively uniform spacing between trees - so, for this example, use a SDMD labeled "Planted Stands."

For this example, use the SDMD for coastal western hemlock planted stands.

STEP THREE - *Select the right site index curve*

On interior sites, use an interior site index curve. On coastal sites, use a coastal site index curve. Select the site index curve that matches the SDMD species. So, for this example, use the site index curve for coastal hemlock.



STEP FOUR - *Assemble your stand data*

To locate the stand on the diagram and project stand growth through time, you need:

a. Trees/ha

Since you want yield predictions for the stand after spacing, use the planned post-spacing density of 800/ha.

b. Top height

Top height was determined during the pre-stand tending survey as 6 m.

c. Site index

For accurate predictions of future yield, you must have an accurate estimate of site index. With the growth intercept method, Hw site index was determined as 27 m.

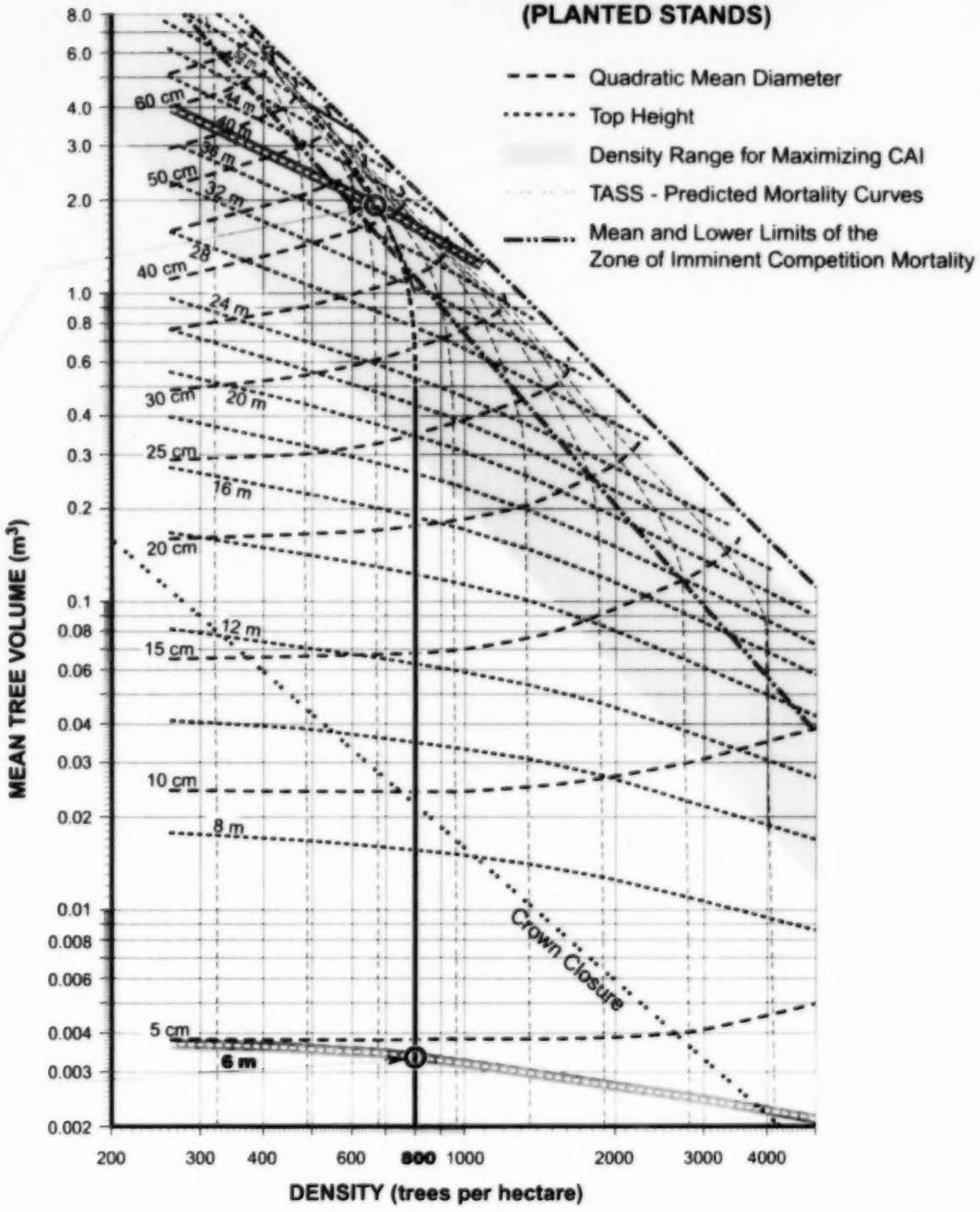
STEP FIVE - *Position the stand on the diagram*

Position the stand on the diagram on the 6-m top height line directly above 800 trees/ha.

STEP SIX - *Plot stand development to rotation*

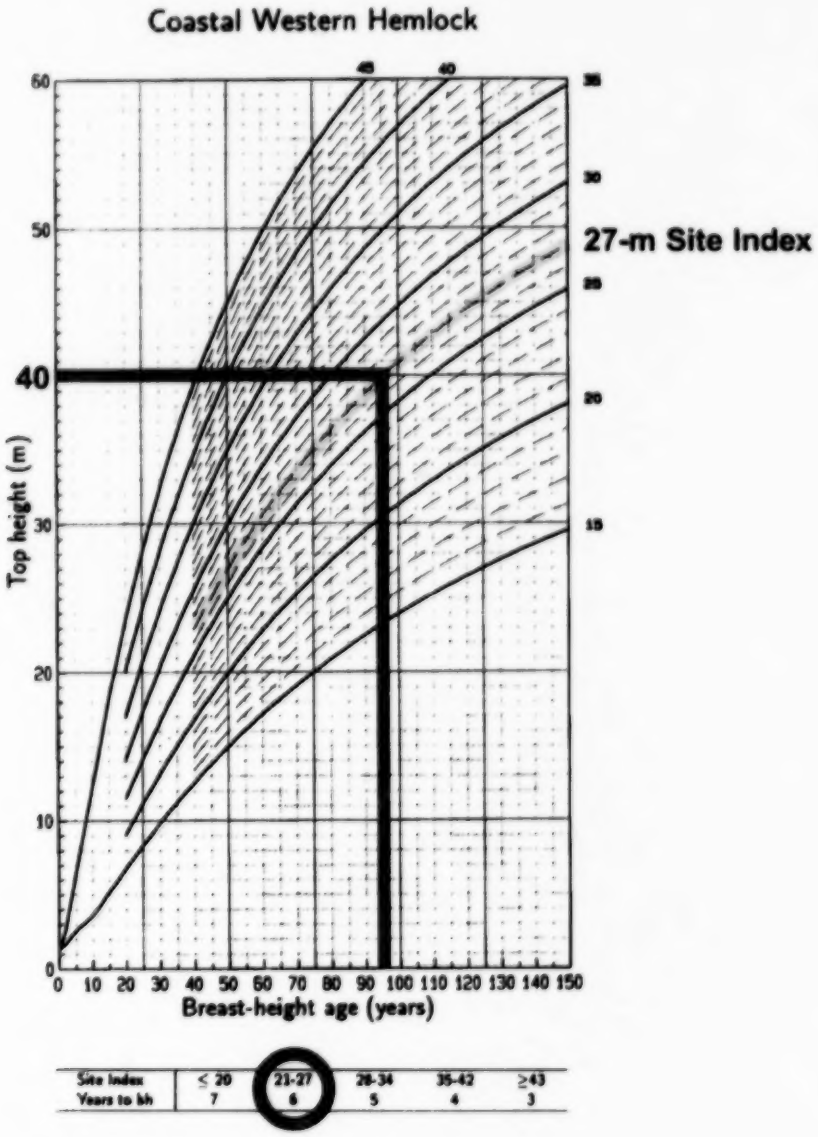
From the stand's current position on the SDMD, plot the stand's development through time by tracing a line up the diagram - paralleling the adjacent mortality curves. For this example, stop when the trajectory crosses the 40-m top height line.

WESTERN HEMLOCK STAND DENSITY MANAGEMENT DIAGRAM
(PLANTED STANDS)



STEP SEVEN - *Translate height to age*

Use the site index curve to translate top height to age. On site index 27, a top height of 40 m is achieved when the stand is 95 years old (breast height age). On site index 27, stands take 6 years to reach breast height. Therefore, at 40-m top height, the total age of the stand will be 101 years.



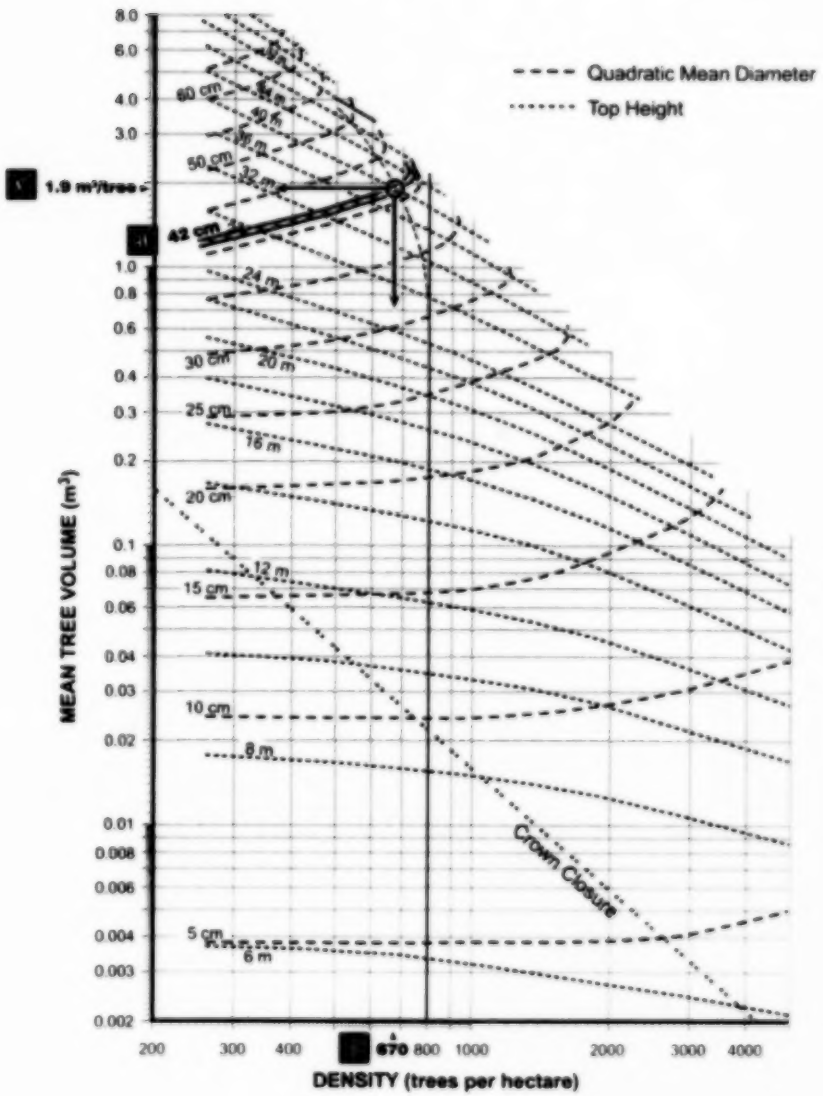
STEP EIGHT - *Read top height, mean diameter, trees/ha, and mean tree volume*

At 40-m top height, read off of the SDMD:

a. Quadratic mean diameter of 42 cm,

b. Density of 670 trees/ha, and

c. Mean total volume of 1.9 m³/tree.



STEP NINE - *Compute volume/ha*

a. Compute total potential volume/ha by multiplying trees/ha by mean total volume/tree:

total potential volume/ha = trees/ha * mean total volume/tree

= 670/ha * 1.9 m^3/tree

= 1273 m^3/ha

b. Estimate recoverable merchantable volume/ha achievable under operational conditions by reducing total potential volume/ha to account for merchantability losses to stumps, tops, and minimum DBH. Further reduction is required to account for OAF1 and OAF2 losses to decay, waste, breakage, and losses to disease, insects, damage, holes in the stand, etc. For this example, assume recoverable merchantable volume is 80% of total potential volume:

recoverable merchantable volume/ha = total potential volume/ha * conversion

= 1273 m^3/ha*0.80

= 1018 m^3/ha

SUMMARY

At a stand total age of 101 years, yield is roughly predicted by the SDMD as:

1) Quadratic mean diameter	42 cm
2) Density	670 trees/ha
3) Top height	40 m
4) Recoverable volume	1018 m^3/ha